

# Claims

- [c1] 1. A plastic conveyor belt module with an embedded roller, the module comprising:
- a module body extending longitudinally from a first end to a second end and in thickness from a first side to a second side and forming a cavity opening onto at least one of the first and second sides;
  - a roller received in the cavity;
  - a retainer inserted into the cavity from one of the first and second sides to retain the roller rotatably in the cavity.
- [c2] 2. A plastic conveyor belt module as in claim 1 wherein the module body includes wall structure defining the cavity, the wall structure including a seat disposed between the first and second sides of the module body and wherein the retainer sits on the seat in the cavity.
- [c3] 3. A plastic conveyor belt module as in claim 2 wherein the retainer is bonded to the seat by means of attachment selected from the group consisting of ultrasonic welding, spin welding, electromagnetic welding, epoxy bonding, and solvent bonding.

- [c4] 4. A plastic conveyor belt module as in claim 2 wherein the retainer is ultrasonically welded to the seat.
- [c5] 5. A plastic conveyor belt module as in claim 2 further comprising keying structure in the wall structure of the module body and on the retainer to key the position of retainer in the cavity.
- [c6] 6. A plastic conveyor belt module as in claim 5 wherein the keying structure includes notches in the seat and protrusions on the retainer that fit in the notches.
- [c7] 7. A plastic conveyor belt module as in claim 6 further comprising an axle spanning the cavity and wherein the roller defines a bore for receiving the axle and wherein the notches in the seat are sized to receive the axle.
- [c8] 8. A plastic conveyor belt module as in claim 5 wherein the keying structure provides for a plurality of specific orientations of the retainer in the cavity.
- [c9] 9. A plastic conveyor belt module as in claim 1 wherein the retainer further includes a top surface flush with the first side of the module body.
- [c10] 10. A plastic conveyor belt module as in claim 1 wherein the retainer is ring-shaped.
- [c11] 11. A plastic conveyor belt module as in claim 1 further

comprising an axle spanning the cavity and wherein the roller defines a bore for receiving the axle.

[c12] 12. A plastic conveyor belt module as in claim 1 wherein the roller is spherical.

[c13] 13. A plastic conveyor belt module as in claim 1 wherein the retainer covers a portion of the roller in the cavity.

[c14] 14. A plastic conveyor belt module as in claim 1 wherein a salient portion of the roller extends beyond the first and second sides of the module body.

[c15] 15. A plastic conveyor belt module as in claim 1 wherein the module body includes wall structure defining the cavity, the wall structure being threaded, and wherein the retainer is a ring with a peripheral thread received in the cavity.

[c16] 16. A plastic conveyor belt module as in claim 1 wherein the module body includes wall structure defining the cavity, the wall structure forming slots along portions of the wall opening onto at least one of the first and second sides of the module body, and wherein the retainer is a ring having locking tabs extending outward of the periphery of the ring and lockably received in the slots.

[c17] 17. A plastic conveyor belt module as in claim 1 wherein

the module body further includes posts extending outward from at least one of the first and second sides of the module body and wherein the retainer includes receptacles for receiving the posts to maintain the retainer in a retaining position retaining the roller in the cavity when the outer ends of the posts are flattened over the retainer.

[c18] 18. A plastic conveyor belt module as in claim 1 comprising a plurality of cavities formed in the module body and a roller and a retainer received in each cavity.

[c19] 19. A plastic conveyor belt comprising a plurality of plastic conveyor belt modules as in claim 1 interconnected to form a conveyor belt.

[c20] 20. A plastic conveyor belt module with an embedded roller, the module comprising:  
a module body extending longitudinally from a first end to a second end and in thickness from a first side to a second side;  
the module body including first hinge eyes spaced apart along the first end and second hinge eyes spaced apart along the second end;  
the module body including internal wall structure defining a cavity opening onto at least one of the

first and second sides;

the internal wall structure including a seat disposed between the first and second sides of the module body;

a roller received in the cavity;

a retainer welded to the seat to retain the roller rotatably in the cavity.

[c21] 21. A plastic conveyor belt module as in claim 20 wherein the retainer is welded to the seat ultrasonically.

[c22] 22. A plastic conveyor belt module as in claim 20 further comprising an axle spanning the cavity and wherein the roller defines a bore therethrough for receiving the axle.

[c23] 23. A plastic conveyor belt module as in claim 20 wherein the retainer is ring-shaped.

[c24] 24. A plastic conveyor belt module as in claim 20 wherein the retainer further includes a top surface flush with the first side of the module body.

[c25] 25. A plastic conveyor belt module as in claim 20 further comprising keying structure in the wall structure of the module body and on the retainer to key the position of retainer in the cavity.

[c26] 26. A plastic conveyor belt module as in claim 25

wherein the keying structure includes notches in the seat and protrusions on the retainer that fit in the notches.

[c27] 27. A plastic conveyor belt module as in claim 26 further comprising an axle spanning the cavity and wherein the roller defines a bore for receiving the axle and wherein the notches in the seat are sized to receive the axle.

[c28] 28. A plastic conveyor belt module as in claim 25 wherein the keying structure provides for a plurality of specific orientations of the retainer in the cavity.

[c29] 29. A plastic conveyor belt module comprising:  
a module body extending in thickness from a first side to a second side and forming a cavity opening onto at least one of the first and second sides;  
a roller forming a bore therethrough;  
an axle received in the bore; and  
a retainer ring received in the cavity and covering the ends of the axle to retain the roller rotatably in the cavity with a salient portion of the roller extending outward of at least one of the first and second sides through the retainer ring.

[c30] 30. A plastic conveyor belt module comprising:  
a module body extending in thickness from a first side to a second side and forming a cavity opening

onto at least one of the first and second sides;  
a spherical roller disposed in the cavity; and  
a retainer ring received in the cavity and covering a portion of the spherical roller to retain the roller rotatably in the cavity with a salient portion of the roller extending outward of at least one of the first and second sides through the retainer ring.

[c31] 31. A plastic conveyor belt module with an embedded roller, the module comprising:  
a module body extending in thickness from a first side to a second side and including interior wall structure defining a cavity opening onto at least one of the first and second sides;  
a roller received in the cavity and arranged to rotate about an axis of rotation;  
a retainer for retaining the roller rotatably in the cavity; and  
keying structure formed on at least one of the interior wall structure and the retainer, the keying structure fixing the orientation of the axis of rotation.

[c32] 32. A plastic conveyor belt module as in claim 31 wherein the keying structure provides alternate keyed orientations for the axis of rotation of the roller.

[c33] 33. A plastic conveyor belt module with an embedded

roller, the module comprising:

- a module body extending in thickness from a first outer surface to a second outer surface and including interior wall structure defining a cavity in the module body, the wall structure including:

- a first closed wall extending from an inner edge to a outer edge terminating at the first outer surface of the module body, the first closed wall having a first diameter;

- a second closed wall coaxial with the first closed wall and extending from an inner edge to an outer edge terminating at the second outer surface and having a second diameter less than the first diameter of the first closed wall;

- a ledge between the inner edge of the first closed wall and the inner edge of the second closed wall;

- a roller disposed in the cavity; and

- a retainer ring dimensioned to be received in the cavity surrounded by the first closed wall to retain the roller rotatably in the cavity with a salient portion of the roller extending through the retainer ring outward of the first outer surface.

[c34] 34. A plastic conveyor belt module with an embedded roller, the module comprising:



a module body extending in thickness from a first outer surface to a second outer surface and including interior wall structure:

- defining a generally rectangular cavity opening onto at least one of the first and second outer surfaces; and

- including a four-sided seat disposed between the first and second outer surfaces of the module body, the seat forming first and second pairs of notches diametrically opposed across the cavity, wherein one of the notches is formed in each side of the seat;

a roller having a central bore;

an axle through the central bore, wherein opposite ends of the axle reside in the first pair of diametrically opposed notches;

a four-sided retainer ring forming a pair of diametrically opposed indentations in one pair of opposite sides and a pair of diametrically opposed protrusions in the other pair of opposite sides;

wherein the retainer ring sits on the seat with the second pair of notches receiving the pair of protrusions on the retainer ring and the indentations covering the ends of the axle.

[c35] 35. A method for making a plastic conveyor belt module having a roller, the method comprising:

molding a plastic conveyor belt module extending in thickness from a first side to a second side and forming a cavity defined by internal closed wall structure and opening onto at least one of the first and second sides;

putting a roller in the cavity; and

installing a retainer in the cavity to retain the roller rotatably in the cavity.

[c36] 36. The method of claim 35 wherein installing the retainer in the cavity includes:

bonding the retainer to the wall structure in the plastic conveyor belt module.

[c37] 37. The method of claim 35 wherein installing the retainer in the cavity includes:

ultrasonically welding the retainer to the wall structure in the plastic conveyor belt module.